

Amendments to the Claims:

The following Listing of Claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

- 1-34. (canceled)
35. (previously presented) The filtering face mask of claim 84, wherein the valve seat is made from a relatively light-weight plastic that is molded into an integral one-piece body.
36. (previously presented) The filtering face mask of claim 35, wherein the valve seat has been made by an injection molding technique.
37. (previously presented) The filtering face mask of claim 84, wherein the seal surface is substantially uniformly smooth to insure that a good seal occurs between the single flexible flap and the seal surface, and wherein the flexible flap is made from a material that is capable of allowing the flap to display a bias towards the seal surface.
38. (previously presented) The filtering face mask of claim 37, wherein the flexible flap is elastomeric and is resistant to permanent set and creep.
39. (previously presented) The filtering face mask of claim 37, wherein the flexible flap is made from an elastomeric rubber.
40. (previously presented) The filtering face mask of claim 84, wherein the flexible flap has a stress relaxation sufficient to keep the flexible flap in an abutting relationship to the seal surface under any static orientation for 24 hours at 70 °C.
41. (previously presented) The filtering face mask of claim 40, wherein the flexible flap provides a leak-free seal according to the standards set forth in 30 C.F.R. § 11.183-2, July 1, 1991.

42. (previously presented) The filtering face mask of claim 84, wherein the flexible flap is made from a crosslinked polyisoprene.

43. (previously presented) The filtering face mask of claim 84, wherein the flexible flap has a Shore A hardness of about 30 to 50.

44. (previously presented) The filtering face mask of claim 84, wherein the flexible flap has a generally uniform thickness of about 0.2 to 0.8 millimeters.

45. (previously presented) The filtering face mask of claim 44, wherein the flexible flap has a generally uniform thickness of about 0.3 to 0.6 millimeters.

46. (previously presented) The filtering face mask of claim 45, wherein the flexible flap has a generally uniform thickness of about 0.35 to 0.45 millimeters.

47. (previously presented) The filtering face mask of claim 84, wherein the one free portion of the flexible flap has a profile that comprises a curve when viewed from the front, which curve is cut to correspond to the general shape of the seal surface.

48. (previously presented) The filtering face mask of claim 47, wherein the flexible flap is greater than one centimeter wide.

49. (previously presented) The filtering face mask of claim 48, wherein the flexible flap is 1.2 to 3 centimeters wide and is about 1 to 4 centimeters long.

50. (previously presented) The filtering face mask of claim 84, wherein the fixed portion of the flexible flap is about 10 to 25 percent of the total circumferential edge of the flexible flap, with the remaining 75 to 90 percent being free to be lifted from the seal surface.

51. (previously presented) The filtering face mask of claim 84, wherein the valve seat includes a flange that provides a surface onto which the exhalation valve can be secured to the mask body, and wherein the flange extends 360 degrees around the valve seat where the valve seat is mounted to the mask body.

52. (previously presented) The filtering face mask of claim 84, wherein the flexible flap is positioned on the valve such that exhaled air is deflected downward during an exhalation when the filtering face mask is worn on a person.

53. (canceled)

54. (previously presented) The filtering face mask of claim 84, wherein a high percentage of the exhaled air is purged through the exhalation valve.

55. (previously presented) The filtering face mask of claim 84, wherein at least 60 percent of the total airflow flows through the exhalation valve under a normal exhalation test.

56. (previously presented) The filtering face mask of claim 55, wherein at least 73 percent of the total airflow flows through the exhalation valve under a normal exhalation test.

57. (previously presented) The filtering face mask of claim 84, wherein the exhalation valve is positioned on the mask body substantially opposite to a wearer's mouth, and wherein the flexible flap is mounted to the valve seat in cantilever fashion.

58-59. (canceled)

60. (previously presented) The filtering face mask of claim 84, which mask further comprises:

a valve cover that is disposed over the valve seat and that comprises:

- (i) an opening that is disposed directly in the path of fluid flow when the free portion of the flexible flap is lifted from the seal surface during an exhalation;
- (ii) a fluid impermeable ceiling that increases in height in the direction of the flexible flap from the first end to the second end; and
- (iii) cross members that are disposed within the opening of the valve cover.

61. (previously presented) The filtering face mask of claim 60, wherein the opening in the valve cover is approximately parallel to the path traced by the second end of the flexible flap during its opening and closing.

62. (previously presented) The filtering face mask of claim 60, wherein the valve cover and its opening direct exhaled fluid flow downwards when the mask is worn on a person.

63. (previously presented) The filtering face mask of claim 62, wherein the valve cover has fluid-impermeable sidewalls.

64-65. (canceled)

66. (currently amended) A filtering face mask that comprises:

- (a) a mask body that is adapted to fit over the nose and mouth of a wearer, that is fluid permeable to air, and that comprises filter media; and
- (b) an exhalation valve that is positioned on the mask body substantially opposite to a wearer's mouth when the mask is being worn, the exhalation valve comprising:
 - (i) a valve seat that comprises:
 - (i) a seal ridge that terminates at a seal surface; and

(ii) an orifice that comprises a plurality of openings separated by cross members and that is circumscribed by the seal ridge and the seal surface; and

(iii) a flap-retaining surface that extends in a straight line in a direction to which the flap-retaining surface traverses the valve seat;

(2) a single flexible flap that is secured to the valve seat, that has a generally uniform thickness[[.]] and that [[has]] is held in an abutting relationship to the flap-retaining surface to create a non-centrally disposed stationary portion and only one free portion of the flap, the flexible flap also having [[and]] a peripheral edge that includes only one stationary segment and only one free segment, the stationary segment of the peripheral edge being associated with the non-centrally disposed stationary portion of the flap so as to remain at rest during an exhalation, and the only one free segment being associated with the only one free portion of the flexible flap so as to be lifted away from the seal surface during an exhalation, the only one free portion also being located below the non-centrally disposed stationary portion when the filtering face mask is worn on a person, wherein the flexible flap would normally assume a flat configuration when not secured to the valve seat and having no forces applied to it but when secured to the valve seat and viewed without a fluid passing through the orifice, the flexible flap (i) has a curved profile over the orifice area when viewed from a side elevation in its closed position on the valve seat and (ii) is pressed towards the seal surface in an abutting relationship therewith under any orientation of the mask body[[.]]; and

(3) a valve cover that has a ceiling that is distanced further from the valve seat proximate the free segment of the peripheral edge of the flexible flap than proximate the stationary segment of the peripheral edge, the valve cover further including a surface that holds the flexible flap in the abutting relationship against the flap-retaining surface.

67. (currently amended) A filtering face mask that comprises:
- (a) a mask body that is adapted to fit over the nose and mouth of a wearer; and
 - (b) an exhalation valve that is positioned on the mask body substantially opposite to a wearer's mouth when the mask is being worn, the exhalation valve comprising:
 - (1) a valve seat that comprises:
 - (i) a seal ridge that terminates at a seal surface; [[and]]
 - (ii) an orifice that comprises a plurality of openings separated by cross members and that is surrounded by the seal ridge and the seal surface when viewing the valve seat from the front; and
 - (iii) a flap-retaining surface that traverses the valve seat in a straight line;
 - (2) a single flexible flap that has a generally uniform thickness and that is held in an abutting relationship to the ~~is secured to the valve seat at a flap-retaining surface, the flexible flap also having and that has~~ a non-centrally disposed stationary portion and only one free portion and a peripheral edge that includes a stationary segment and a free segment, the stationary segment of the peripheral edge being associated with the non-centrally disposed stationary portion of the flap so as to remain at rest during an exhalation, and the free segment being associated with the only one free portion of the flexible flap so as to be lifted away from the seal surface during an exhalation, the only one free portion also being located below the non-centrally disposed stationary portion when the filtering face mask is worn on a person, wherein the flexible flap would normally assume a flat configuration when not secured to the valve seat and having no forces applied to it but when secured to the valve seat and viewed without a fluid passing through the orifice, the single flexible flap (i) has a curved profile over the orifice area when viewed from a side elevation in its secured position on the valve seat and (ii) is pressed towards the seal surface in an abutting relationship therewith under any orientation of the mask body[. . .]; and
 - (3) a valve cover that has a ceiling that is distanced further from the valve seat proximate the free segment of the peripheral edge of the flexible flap than proximate the stationary segment of the peripheral edge, the valve cover further including a surface that holds the flexible flap in the abutting relationship against the flap-retaining surface.

68. (previously presented) The filtering face mask of claim 67, wherein the seal surface is substantially uniformly smooth to insure that a good seal occurs between the single flexible flap and the seal surface, and wherein the flexible flap is made from a material that is capable of allowing the flap to display a bias towards the seal surface.

69. (previously presented) The filtering face mask of claim 67, wherein the flexible flap is elastomeric and is resistant to permanent set and creep.

70. (previously presented) The filtering face mask of claim 67, wherein the flexible flap is made from an elastomeric rubber that has a stress relaxation sufficient to keep the flexible flap in an abutting relationship to the seal surface under any static orientation for 24 hours at 70 °C, and wherein the flexible flap provides a leak-free seal according to the standards set forth in 30 C.F.R. § 11.183-2, July 1, 1991.

71. (previously presented) The filtering face mask of claim 70, wherein the flexible flap is made from a crosslinked polyisoprene.

72. (previously presented) The filtering face mask of claim 67, wherein the flexible flap has a Shore A hardness of about 30 to 50, and has a generally uniform thickness of about 0.3 to 0.6 millimeters.

73. (previously presented) The filtering face mask of claim 67, wherein the one free portion of the flexible flap has a profile that comprises a curve when viewed from the front, which curve is cut to correspond to the general shape of the seal surface, and wherein the flexible flap is 1.2 to 3 centimeters wide and is about 1 to 4 centimeters long.

74. (previously presented) The filtering face mask of claim 67, wherein the fixed portion of the flexible flap is about 10 to 25 percent of the total circumferential edge of the flexible flap, with the remaining 75 to 90 percent being free to be lifted from the seal surface.

75. (previously presented) The filtering face mask of claim 67, wherein the flexible flap is positioned on the valve such that exhaled air is deflected downward during an exhalation when the filtering face mask is worn on a person.

76. (previously presented) The filtering face mask of claim 67, wherein the mask body is cup-shaped and comprises at least one layer for providing structure to the mask and a filtration layer, the at least one structure-providing layer being located outside of the filtration layer.

77. (previously presented) The filtering face mask of claim 67, wherein at least 60 percent of the total airflow flows through the exhalation valve under a normal exhalation test.

78. (previously presented) The filtering face mask of claim 67, wherein at least 73 percent of the total airflow flows through the exhalation valve under a normal exhalation test.

79. (previously presented) The filtering face mask of claim 67, wherein the exhalation valve is positioned on the mask body substantially opposite to a wearer's mouth, and wherein the flexible flap is mounted to the valve seat in cantilever fashion.

80. (previously presented) The filtering face mask of claim 67, wherein the shape of the orifice does not wholly correspond to the shape of the seal surface.

81. (currently amended) A filtering face mask that comprises:
- (a) a substantially cup-shaped mask body that is fluid permeable, contains a layer of filter media, and is adapted to fit over the nose and mouth of a wearer; and
 - (b) an exhalation valve that is positioned on the mask body substantially opposite to a wearer's mouth when the mask is being worn, the exhalation valve comprising:
 - (1) a valve seat that comprises:
 - (i) a seal ridge that terminates at a seal surface; [[and]]
 - (ii) an orifice that comprises a plurality of openings separated by cross members and that is surrounded by the seal ridge and the seal surface when viewing the valve seat from the front, the orifice including a plurality of openings through which exhaled air primarily passes during an exhalation; and
 - (iii) a flap-retaining surface that is located above the plurality of openings when viewing the filtering face mask from the front in an upright position;
 - (2) a single flexible flap that has a generally uniform thickness, that is secured to the valve seat, and that has a non-centrally disposed stationary portion and only one free portion and a peripheral edge that includes only one free segment, the non-centrally disposed stationary portion of the flap remaining essentially stationary during an exhalation, and the only one free segment of the peripheral edge being associated with the only one free portion of the flexible flap so as to be lifted away from the seal surface during an exhalation, wherein the flexible flap would normally assume a flat configuration when not secured to the valve seat and having no forces applied to it but when secured to the valve seat and viewed when a fluid is not passing through the orifice, the single flexible flap (i) has a curved profile when viewed from a side elevation in its closed position on the valve seat and (ii) is pressed towards the seal surface in an abutting relationship therewith, under any orientation of the mask[.]; and
 - (3) a valve cover that is disposed over the valve seat and that comprises:
 - (i) an opening that is disposed directly in the path of fluid flow when the free portion of the flexible flap is lifted from the seal surface during an exhalation;

- (ii) a fluid impermeable ceiling that increases in height in the direction of the flexible flap from the first end to the second end;
- (iii) cross members that are disposed within the opening of the valve cover; and
- (iv) a surface that holds the flexible flap in an abutting relationship to the flap-retaining surface on the valve seat.

82. (previously presented) The filtering face mask of claim 33, wherein the shape of the orifice does not wholly correspond to the shape of the seal surface.

83. (previously presented) The filtering face mask of claim 60, wherein the opening in the valve cover is at least the size of the orifice in the valve seat.

84. (currently amended) A filtering face mask that comprises:

(a) a substantially cup-shaped mask body that is fluid permeable, that contains a layer of filter media, and that is adapted to fit over the nose and mouth of a wearer; and

(b) an exhalation valve that is positioned on the mask body substantially opposite to a wearer's mouth when the mask is being worn, the exhalation valve comprising:

(1) a valve seat that comprises:

(i) a seal ridge that includes a seal surface;

(ii) an orifice that is surrounded by the seal ridge and the seal surface when viewing the valve seat from the front and that includes a plurality of openings through which exhaled air passes during an exhalation to exit the mask interior; and

(iii) a flap-retaining surface;

(2) a single flexible flap that has a generally uniform thickness and that is secured to the valve seat at the flap-retaining surface in an abutting relationship therewith to provide a non-centrally disposed stationary portion and only one free portion, the flexible flap having a peripheral edge that includes a free segment, the non-centrally disposed stationary portion of the flap remaining essentially stationary during an exhalation, and the free segment of the peripheral edge being associated with the only one

free portion of the flexible flap so as to be lifted away from the seal surface during an exhalation, wherein the flexible flap would normally assume a flat configuration when not secured to the valve seat and having no forces applied to it but when secured to the valve seat and viewed from a side elevation with no fluid passing through the orifice, the single flexible flap exhibits a curved profile in a closed position on the valve seat over the orifice area such that the flap is biased toward the seal surface to keep the flap in a closed position-an abutting relationship with the seal surface, under any orientation of the mask.

85. (previously presented) The filtering face mask of claim 84, further comprising a valve cover that has a ceiling that is distanced further from the valve seat proximate the free segment of the peripheral edge of the flexible flap than proximate the stationary segment of the peripheral edge, the valve cover further including a surface that holds the flexible flap against the flap-retaining surface.

86. (previously presented) The filtering face mask of claim 85, wherein the valve cover is secured to the valve seat by being ultrasonically welded thereto.

87. (previously presented) The filtering face mask of claim 84, wherein the plurality of openings includes four openings.

88. (previously presented) The filtering face mask of claim 87, wherein the flap-retaining surface is planar and is located outside the region encompassed by the plurality of openings in the valve seat.

89. (previously presented) The filtering face mask of claim 88, wherein the flap-retaining surface is planar and non-circular in shape.

90. (previously presented) The filtering face mask of claim 89, wherein the flap-retaining surface is spaced from the region encompassed by the plurality of openings by at about 1 to 3.5 millimeters.